

## **ABSTRACT**

A method of fabricating a lightly doped drain region of a low temperature polysilicon thin film transistor is provided. First, a polysilicon layer is formed over a substrate, and then a gate insulation layer is formed over the polysilicon layer. A gate buffer layer and a gate are formed over the gate insulation layer, wherein the gate is formed on the gate buffer layer and a portion of the gate buffer layer is exposed. Next, a doping process is performed to form the lightly doped drain region in the polysilicon layer underneath the exposed portion of the gate buffer layer. Thus, a low temperature polysilicon thin film transistor is formed via a simplified process and the overall fabrication cost can be reduced and the production efficiency can be substantially improved.